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BOOK REVIEW

Spectroscopy–Perspectives and Frontiers
edited by A P Roy
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The book is primarily based on the collection of talks delivered at the International Conference on Spectroscopy : Perspectives and Frontiers dedicated to late Professor R. K. Asundi, held during January 3-5, 1996 at BARC, Mumbai. Spectroscopy has traveled a long way continuously enriching the front-line areas of Physics, Chemistry and other branches of science. Rightly, the book has done justice to both conventional aspects of spectroscopy like, age-old diatomic spectroscopy, Rydberg transitions etc. and also to the emerging areas like, microlaser and Bose-Einstein condensation in trapped alkali atoms in nano-Kelvin temperature domain. In that way Narosa Publishing House has done a commendable job because this type of publication benefits both the professionals and the newcomer. We expect more of this type in future.

Twenty-seven articles on varied aspects have been accommodated in this book. Late Prof. Asundi was instrumental in establishing spectroscopy laboratory at BARC and the article by T. K. Balasubramanian on Prof. Asundi's enduring legacy takes one to the inception of molecular spectroscopy laboratory and the beautiful work done in Asundi and post-Asundi era relating to diatomic spectroscopy and also some goal oriented programs have nicely been discussed there. Some four excellent reviews are there on the spectroscopy of interstellar and stellar molecules and atoms. Of them T. Oka delineates the infrared spectrum of protonated hydrogen molecule in laboratory and space plasma. Stellar spectroscopy with Hubble Space Telescope has been dealt with by I. Martinson and coworkers. D. L. Lambert describes the presence of carbon monoxide in interstellar clouds through Goddard High resolution Spectrometer in Hubble Space Telescope. Finally K. Kawaguchi narrates the spectroscopy of circumstellar envelope of late type star IRC + 10216 and finds some unidentified lines due to some new metal compounds. K. An *et al* describes in article 5 about new emerging area of one-atom microlaser which is quite capable of exhibiting new quantum optics features, like atom-field entanglement, photon-number trapped state, squeezing etc. The article by E. Otten discusses a new thing – the technique of production of spin polarized ^{3}He and its usefulness in interdisciplinary areas like particle physics, neutron physics and clinical research. S. S. Jha in article 7 dwells on a contemporary topic cooling and Bose-Einstein condensation in a pedagogic manner starting from BEC in an ideal gas to laser cooling and magnetic trapping of neutral atoms and presents the experimental status with some questions on possible future investigations. B. N. Jagtap presents some interesting aspects of multiphoton ionization of hydrogen in intense laser fields. In a brief review W. J. Balfour delineates nicely the spectral

investigations of small transition metal containing chemically important molecules with an indication of rich field to be explored. A complete analysis of Rydberg-Rydberg spectra of Argon hydride is given by I. Dabrowski and coworkers in article 11. The Dieke narrowing of oxygen A-band by near i.r. diode laser spectroscopy has been briefly discussed in article 12. While discussing pressure broadening and shift in molecular spectra G. Buffa and coworkers have pointed out the drawback of some oversimplified model and also the good agreement in the models which consider the energy transfer between translation and internal degrees of colliding molecules. V. A. Job in article 14 delineates nicely the analysis of high resolution infrared spectrum of polyatomic molecules and the importance of considering vibration-rotation interactions. Some recent studies on the high resolution spectroscopy of the local mode stretch overtones and the related theoretical model have been discussed by Zhu *et al* in article 15. They have also discussed the way for making local mode vibration state long-lived by laser-molecule interaction. L. Nemes in article 16 gives a brief overview of results of spectroscopic and photochemical studies of much interesting ketene molecule with some hint on future trends. The importance of Optogalvanic and Photoacoustic spectroscopic studies to probe the dark Rydberg states has been discussed nicely by S. N. Thakur. In article 18 Fraser *et al* summarize the investigations of substituent effects in C-H group hydrogen bonding using high resolution molecular beam spectroscopy. Matrix isolation spectroscopy is a very efficient mode to study intermolecular interaction, conformation of molecules, van der Waals complexes, spectroscopy of transient species etc. In article 19 K. S. Viswanathan has nicely discussed their work on matrix isolation experiments using supersonic jet source. In synthesis and optical spectroscopy of single crystal insulating fibres W. M. Yen and D. Cohen have elaborately discussed the growth of single crystal fibre by laser heated pedestal growth method. Raman and phonon spectroscopic studies of certain physical properties of these fibres which are difficult to get in bulk crystals are also discussed. In article 21 A. Prasad *et al* describe the technique of Photoemission Optogalvanic effect and some of its applications showing that this effect depends upon laser power and discharge conditions producing some non-linear chaotic behaviour. With the advent of laser and high-speed computers various non-linear optical effects could be observed involving laser beam. P. Venkateswarlu and coworkers have demonstrated in article 22 that some selected dyes doped in polystryrene microsphere show morphology dependent lasing resonances with a critical diameter greater than exciting laser wavelength. V. B. Kartha *et al* have discussed how the laser induced fluorescence could be applied to detection and analysis of cancer producing polycyclic aromatic hydrocarbon adducts of DNA. J. Connerade has written a very good article on giant resonance in atomic physics and its connection to solid state physics and other several disciplines. J. C. Krupa *et al* in article 25 discussed the visible luminescence spectra of lanthanide ions in different host lattices with futuristic applications of new phosphors to be used in new generation lamps. In article 26 A. P Roy gives a nice overview of different types of spectroscopic research could be done using new Synchroton Radiation source at Indore which will certainly usher a new era. S. A. Ahmad in the last article presents high resolution atomic spectroscopy of rare earths.

The overall presentation of the book is very good, though in some places the printer's devil have crept in. It is a very useful overview of different aspects of spectroscopy which the professionals and the newly entrants find it a ready source of materials in the contemporary areas of the field. The editor should be congratulated for putting up an invaluable book.

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